Coursera Capstone Project

Location of an Indian / S.Indian restaurant in Hartford county, Connecticut

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Table of Contents

Introduction

I’ve lived in Hartford the last 20 years. In recent years, I’ve felt the desire for a career change, specifically starting my own restaurant, catering South Indian food. I’ve noticed that there are not very many South Indian food catering options in the area, while the South Indian demographic has steadily grown in the last few years.

The approach will be to identify high income, high population density towns in Hartford county to locate this restaurant.

Business value

The objective of this capstone project is to find the most suitable location for the entrepreneur to open a new South India restaurant in Hartford county, Connecticut. By using data science methods and machine learning methods such as clustering, this project aims to provide solutions to answer the business question: where should an entrepreneur consider opening a South Indian restaurant in Hartford, Ct

Target Audience

Anyone interested in opening a South Indian restaurant in Hartford, Ct.

Data and Methodologies

To solve this problem, we will need the below data:

List of towns in Hartford county, Connecticut.

Latitude and Longitude of these towns.

Venue data related to Indian and Asian grocery stores and restaurants.

This will help us find the towns that are most suitable to open the restaurant.

Extracting the data

Scrapping of Hartford neighborhoods via https://www.geonames.org/postal-codes/US/CT/003/hartford.html to get latitudes and longitudes

https://en.wikipedia.org/wiki/Hartford,_Connecticut to get population and per capita income information.

Using Foursquare API to get venue data related to these neighborhoods

Methodologies – creating the dataframe to conduct further analysis

	Town	Latitude	Longitude
0	Avon	41.80	-72.83
1	Berlin	41.62	-72.75
2	Bloomfield	41.83	-72.74
3	Bristol	41.68	-72.94
4	Burlington	41.77	-72.96
5	Canton	41.83	-72.90

	Town	Per capita income	Population	Pop. Density
0	Avon	66862	22290	781
1	Berlin	38134	19866	736
2	Bloomfield	39738	20486	779
3	Bristol	29629	60477	2257
4	Burlington	43392	9301	306
5	Canton	46401	10292	412

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Dataframe with the latitude, longitude, population and per capita income info

Methodologies – using Foursquare to conduct venue analysis

	Town	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Avon	41.80	-72.83	Elephant Trail	41.808008	-72.828137	Thai Restaurant
1	Avon	41.80	-72.83	Max a Mia	41.807845	-72.824397	Italian Restaurant
2	Avon	41.80	-72.83	Bruegger's Bagel Bakery	41.807357	-72.827398	Bagel Shop
3	Avon	41.80	-72.83	The UPS Store	41.807955	-72.827703	Shipping Store
4	Avon	41.80	-72.83	SUBWAY	41.808727	-72.828960	Sandwich Place
5	Avon	41.80	-72.83	Dunkin'	41.807046	-72.824549	Donut Shop
6	Avon	41.80	-72.83	Pick and Mix	41.807818	-72.827272	Korean Restaurant
7	Avon	41.80	-72.83	Countryside	41.801062	-72.824035	Trail
8	Avon	41.80	-72.83	My Dog's Daycare/Doggy Do's	41.797072	-72.836619	Pet Store
9	Avon	41.80	-72.83	Avon Hair Company	41.799881	-72.819965	Health & Beauty Service
10	Avon	41.80	-72.83	Avon House Painting by Franklin	41.802233	-72.839800	Construction & Landscaping
11	Avon	41.80	-72.83	Farmington River	41.806096	-72.823735	River
12	Avon	41.80	-72.83	Carmen Anthony Fishhouse	41.807446	-72.826834	Seafood Restaurant
13	Avon	41.80	-72.83	Avon Cider Mill	41.801753	-72.819343	Farmers Market
14	Avon	41.80	-72.83	Welcome Wine & Liquor	41.807975	-72.827813	Wine Shop
15	Avon	41.80	-72.83	Hot Heaven Pizza	41.807975	-72.827813	Pizza Place
16	Avon	41.80	-72.83	Cake Gypsy	41.808084	-72.827891	Bakery
17	Avon	41.80	-72.83	Little Silver Shop	41.808514	-72.828764	Jewelry Store
18	Avon	41.80	-72.83	Village Garage and Tire Center	41.808786	-72.829828	Auto Workshop

Town	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Avon	19	19	19	19	19	19
Berlin	14	14	14	14	14	14
Bloomfield	37	37	37	37	37	37
Bristol	38	38	38	38	38	38
Burlington	16	16	16	16	16	16
Canton	23	23	23	23	23	23
East Granby	12	12	12	12	12	12
East Hartford	22	22	22	22	22	22
East Windsor	2	2	2	2	2	2
Enfield	5	5	5	5	5	5
Farmington	30	30	30	30	30	30
Glastonbury	11	11	11	11	11	11
Granby	19	19	19	19	19	19
Hartford	100	100	100	100	100	100
Manchester	22	22	22	22	22	22
Marlborough	15	15	15	15	15	15
New Britain	33	33	33	33	33	33
Newington	21	21	21	21	21	21
Plainville	43	43	43	43	43	43
Rocky Hill	18	18	18	18	18	18

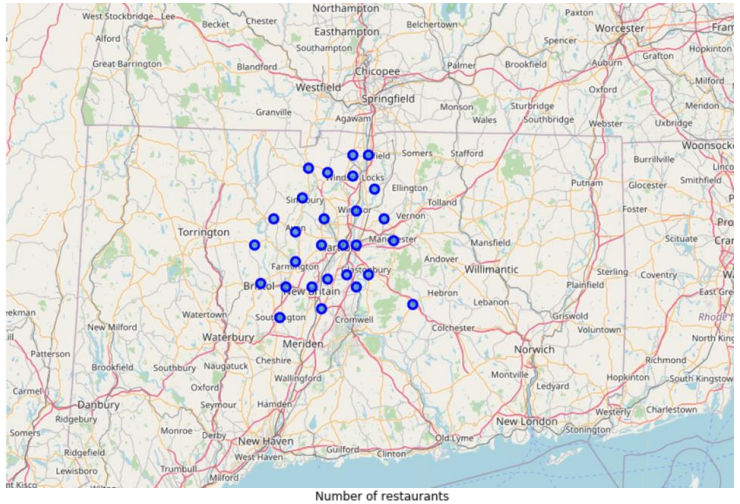
Similarly, venue data for other towns was collated and summarized, per the table on the right.
We can see that Hartford has the most (100) while towns of East Windsor and Enfield very few.

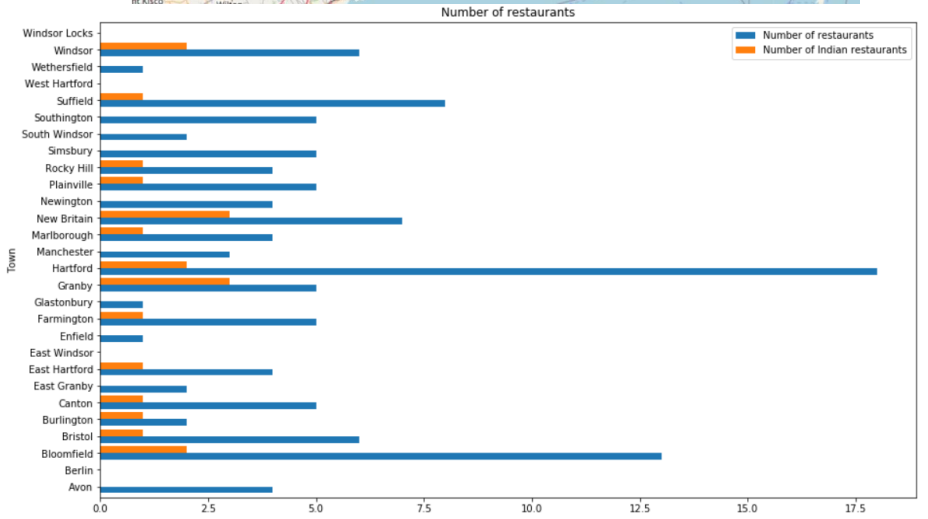
Methodologies – using Foursquare to conduct restaurant analysis

Town	Number of restaurants
Avon	4
Bloomfield	13
Bristol	6
Burlington	2
Canton	5
East Granby	2
East Hartford	4
Enfield	1
Farmington	5
Glastonbury	1
Granby	5
Hartford	18
Manchester	3
Marlborough	4
New Britain	7
Newington	4
Plainville	5
Rocky Hill	4
Simsbury	5
South Windsor	2
Southington	5

Filter on Indian restaurants

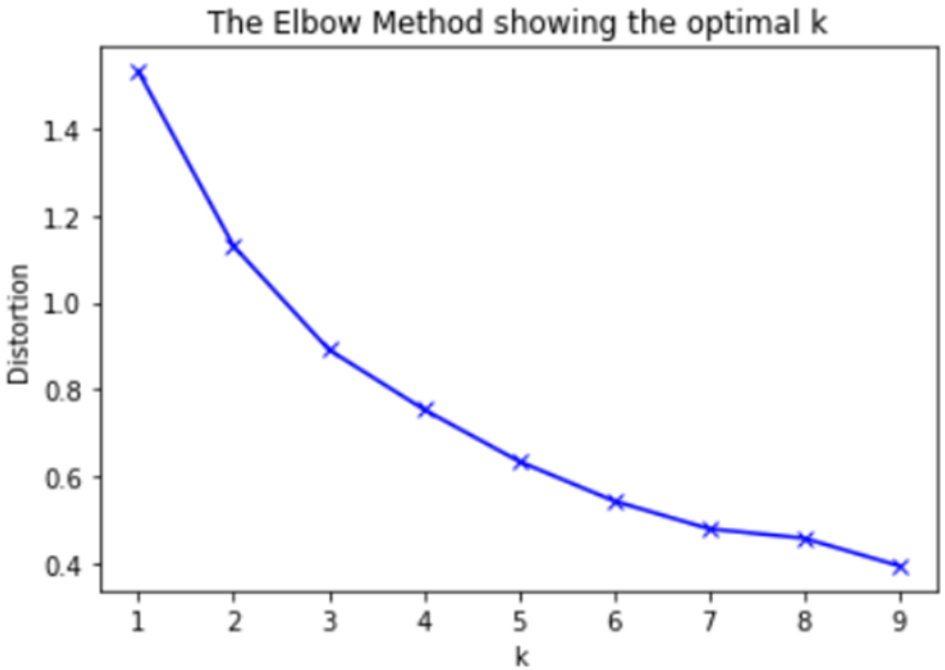
Town	Number of Indian restaurants
Bloomfield	2
Bristol	1
Burlington	1
Canton	1
East Hartford	1
Farmington	1
Granby	3
Hartford	2
Marlborough	1
New Britain	3
Plainville	1
Rocky Hill	1
Suffield	1
Windsor	2



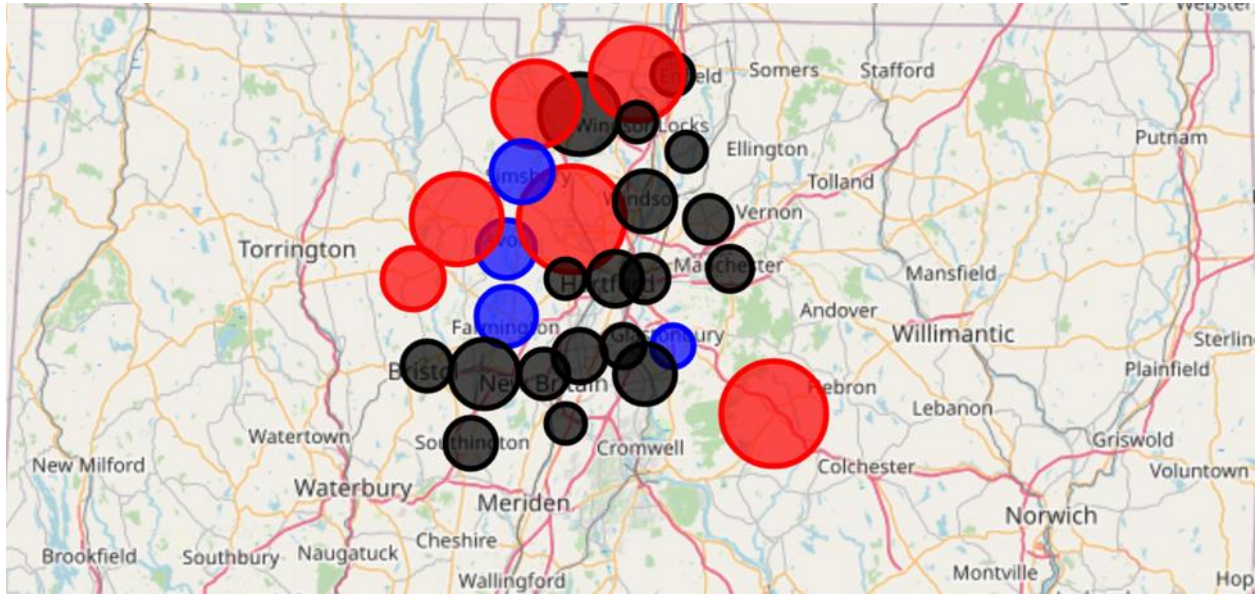


Now, we can filter on total number of restaurants, and finally arrive at the number of Indian restaurants by town (right table).

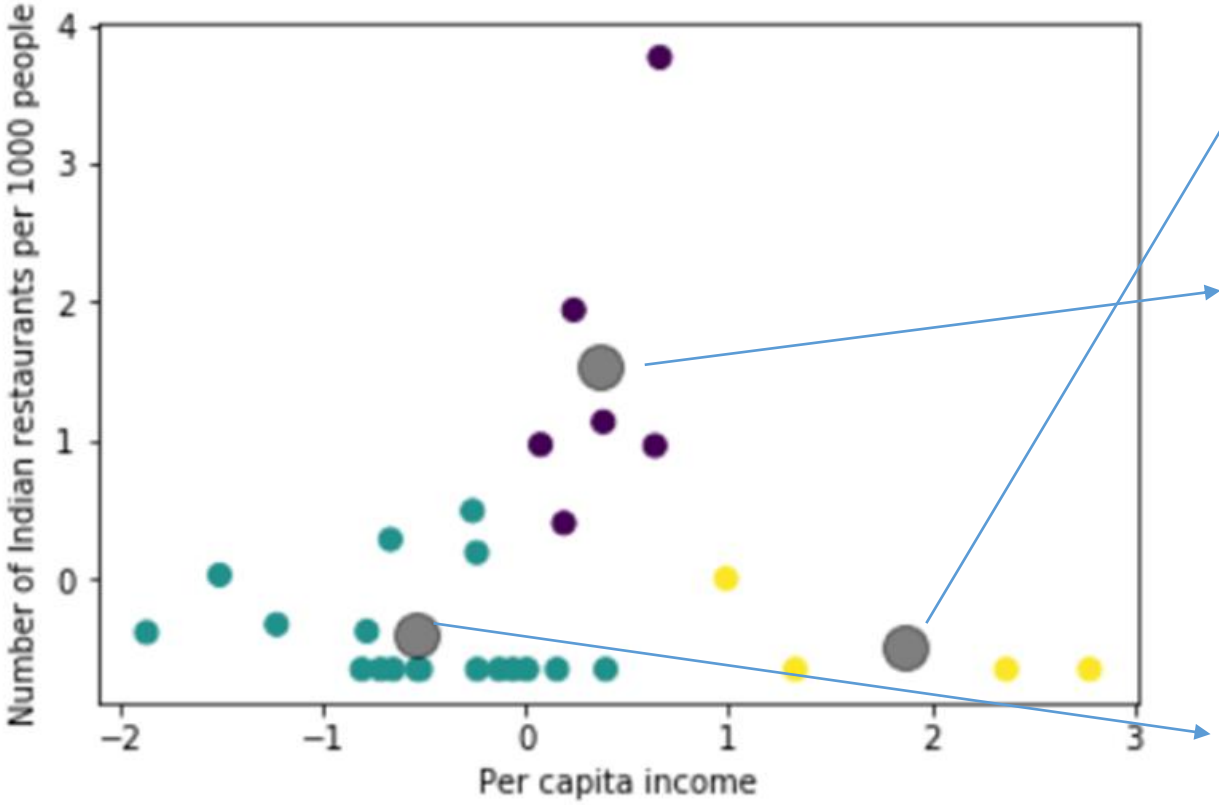
Methodologies – using k-means clustering



This analysis suggests k=3 can be used.



Methodologies – using k-means clustering



	Cluster Labels	Town	Latitude	Longitude	Per capita income	Population	Pop. Density	Number of restaurants	Number of Indian restaurants
0	2	Avon	41.80	-72.83	66862	22290	781	4.0	0.0
10	2	Farmington	41.73	-72.83	50541	25340	881	5.0	1.0
11	2	Glastonbury	41.70	-72.60	71709	34427	660	1.0	0.0
20	2	Simsbury	41.88	-72.81	54571	23511	685	5.0	0.0

	Cluster Labels	Town	Latitude	Longitude	Per capita income	Population	Pop. Density	Number of restaurants	Number of Indian restaurants
2	0	Bloomfield	41.83	-72.74	39738	20486	779	13.0	2.0
4	0	Burlington	41.77	-72.96	43392	9301	306	2.0	1.0
5	0	Canton	41.83	-72.90	46401	10292	412	5.0	1.0
12	0	Granby	41.95	-72.79	46687	11282	277	5.0	3.0
15	0	Marlborough	41.63	-72.46	41669	6404	272	4.0	1.0
23	0	Suffield	41.98	-72.65	41098	15735	366	8.0	1.0

	Cluster Labels	Town	Latitude	Longitude	Per capita income	Population	Pop. Density	Number of restaurants	Number of Indian restaurants
1	1	Berlin	41.62	-72.75	38134	19866	736	0.0	0.0
3	1	Bristol	41.68	-72.94	29629	60477	2257	6.0	1.0
6	1	East Granby	41.94	-72.73	40698	5148	291	2.0	0.0
7	1	East Hartford	41.77	-72.64	24373	51252	2741	4.0	1.0
8	1	East Windsor	41.90	-72.58	31162	11162	416	0.0	0.0
9	1	Enfield	41.98	-72.60	29340	44654	1306	1.0	0.0
13	1	Hartford	41.77	-72.68	16798	124775	6932	18.0	2.0
14	1	Manchester	41.78	-72.52	32752	58241	2103	3.0	0.0
16	1	New Britain	41.67	-72.78	21056	73206	5463	7.0	3.0
17	1	Newington	41.69	-72.73	32561	30562	2333	4.0	0.0
18	1	Plainville	41.67	-72.86	31000	17716	1814	5.0	1.0
19	1	Rocky Hill	41.67	-72.64	36021	19709	1426	4.0	1.0
21	1	South Windsor	41.83	-72.55	38945	25709	896	2.0	0.0
22	1	Southington	41.60	-72.88	36053	43069	1177	5.0	0.0
24	1	West Hartford	41.77	-72.75	43534	63268	2837	0.0	0.0
25	1	Wethersfield	41.70	-72.67	37329	26668	2036	1.0	0.0
26	1	Windsor	41.85	-72.64	35780	29044	937	6.0	2.0
27	1	Windsor Locks	41.93	-72.65	30436	12498	1330	0.0	0.0

Discussion and conclusion

From cluster 2, it appears that Avon, Simsbury and Glastonbury are high per capita income towns with ZERO Indian restaurants, so these could be reasonable choices.

However, in cluster 1, **West Hartford** looks very attractive. With only a 25% lower per capita income, but with > 250% population density, the chances of an Indian restaurant surviving and flourishing in this town is far greater than in the cluster 2 towns identified above.